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problem here is that even a slight error of about 0.1 gram can make a deviation in resonance frequency.

In view of the conventionally experienced inconveniences and disadvantages described above, it is an object of the present invention to provide a method by which a resonance frequency can be adjusted to a target value by correcting differences among the weights of individual displacers by the use of a simple scheme and inexpensive components.

Disclosure of the invention

To achieve the above object, according to the present invention, in a method for adjusting the resonance frequency of a vibration system having a movable body fixed to a plate spring, an additional weight that achieves a target resonance frequency is calculated in advance, and a weight corresponding to the calculated additional weight is added to the vibration system.

With this method, in the vibration system as a whole, the movable body is made to reciprocate with a weight equal to the sum of its own weight and the calculated addition weight.

Advisably, the procedure for calculating the additional weight includes the steps of: fixing the movable body or a weight corresponding to the weight of the movable body to a plate spring; applying slight vibration to the plate spring; detecting the resonance frequency of the vibration; and calculating, based on the detected resonance frequency, an additional weight that achieves the target resonance frequency.

The resonance frequency adjusting method described above can be applied to a Stirling engine provided with: a cylinder; a piston and a displacer that reciprocate in the direction of an axis of the cylinder; and a displacer supporting spring elastically supporting

the displacer, wherein the displacer is fixed at the center of the displacer supporting piston. With this method, the displacer is fixed to the displacer supporting spring along with a washer having the weight corresponding to the calculated additional weight that achieves the target resonance frequency. This makes it possible to adjust the resonance frequency of the
5 displacer vibration system to a target value.

Brief description of drawings

Fig. 1 is a sectional view showing an example of a free-piston Stirling refrigerating unit embodying the invention;

10 Fig. 2A is a plan view showing an example of a plate spring constituting a piston supporting spring;

Fig. 2B is a side sectional view of the plate spring;

Fig. 3A is a plan view showing an example of a plate spring constituting a displacer supporting spring;

15 Fig. 3B is a side sectional view of the plate spring;

Fig. 4 is a partially exploded sectional view showing the procedure for mounting a piston supporting spring and a displacer supporting spring on a Stirling refrigerating unit;

Fig. 5 is a schematic side sectional view showing the procedure for adjusting the resonance frequency of a displacer vibration system; and

20 Fig. 6 is a flow chart of the adjustment procedure.

Best mode for carrying out the invention

An example of how the present invention is carried out will be described below with reference to the accompanying drawings. Fig. 1 is a sectional view showing an example of a

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